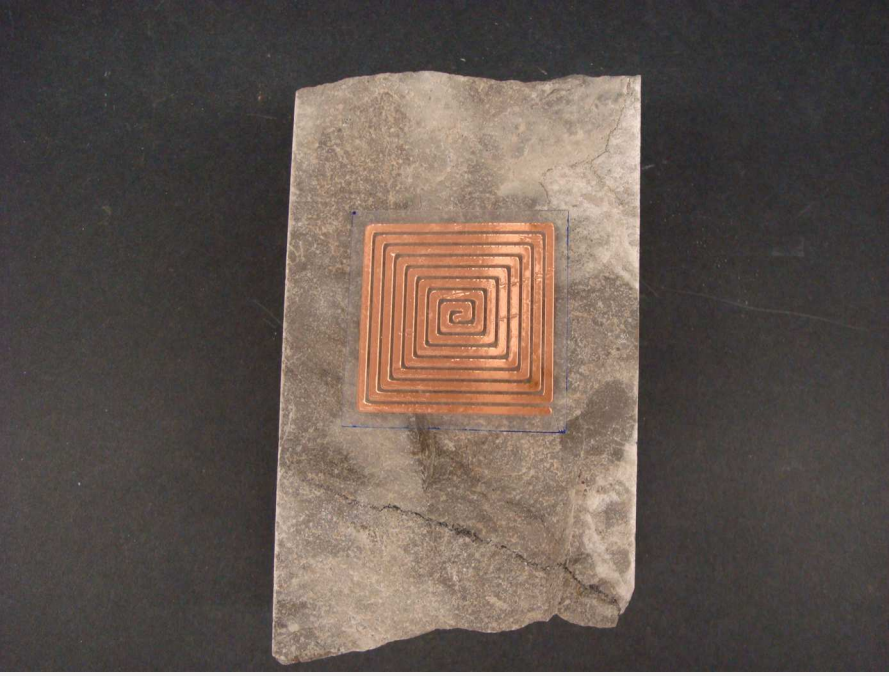


National Aeronautics and
Space Administration

Sensors

SansEC Spectroscopy

Spectroscopy using electric permittivity, magnetic permeability and electrical conductivity spatial profiles

This innovation builds off of NASA Langley Research Center's SansEC sensing system. SansEC is an open-circuit, resonant sensor that needs no electrical connections (thus the name SansEC or "without electrical connection"). This technology combines the SansEC circuit with a magnetic field reader to allow for detection of magnetic or electric field changes to produce a spectroscopy readout.

BENEFITS

- Measures changes to both the magnetic and electric fields and characterizes one or more of a material's intrinsic electrical property in terms of permittivity, permeability, or conductivity.
- Spatially locates a surface or subsurface material anomaly.
- Easy to implement, only requiring a SansEC circuit and a magnetic field response recorder.
- Sensor does not require electrical connections.
- Lead free.

technology solution

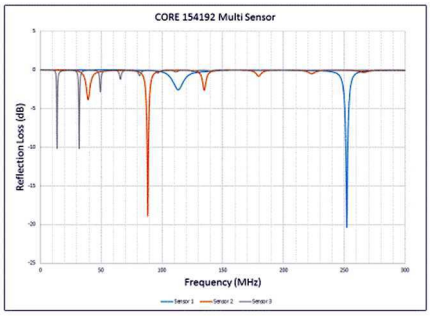
THE TECHNOLOGY

This technology is a method of identifying material anomalies and defects on or within a material by observing and quantifying how a localized change in either conductivity, permeability or permittivity changes the responding electric field and magnetic fields. This approach has many advantages over typical spectroscopy methods, particularly because typical methods only measure changes in the electric field.

This advancement will allow for potentially deeper detection of a material's abnormalities/defects (including subsurface measurements) with limited electrical requirements. The technology has applications as diverse as medical oncology screenings or surface measurements of aeronautic skins.

Another promising application is bore hole geological spectroscopy. In such an application, an array of sensors could be embedded into bore hole drills for exploratory deep wells. As the drill tooling slides past the bore hole wall, spectroscopic sampling of the side walls reveals important dielectric property information that is highly useful to prospectors and geologists in determining the probability of specific resources that may exist in the subterranean geology.

Bore hole sensing is one promising application of the technology.



Spectrogram from three SansEC sensors each of which resonated at a uniquely different fundamental frequency.

APPLICATIONS

The technology has several potential applications:

- Geological Spectroscopy, including in mining, bore hole and core sampling, farming and agriculture, ground penetrating radar, and remote sensing on Earth and terrestrial bodies.
- Nondestructive testing, including identifying delamination in non-conductive composites.
- Hazardous material monitoring.
- Zero-gravity fluid volume measurement.
- Noninvasive medical monitoring and scanning, including oncology applications.

PUBLICATIONS

Patent Pending

More Information

National Aeronautics and Space Administration

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NASA's Technology Transfer Program pursues the widest possible applications of agency technology to benefit US citizens. Through partnerships and licensing agreements with industry, the program ensures that NASA's investments in pioneering research find secondary uses that benefit the economy, create jobs, and improve quality of life.

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